PATENT ABSTRACTS OF JAPAN

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(71)Applicant : OLYMPUS OPTICAL CO LTD

(72)Inventor : TABATA SEIICHIRO

(54) **VIDEO SYSTEM**

(57)Abstract:

PROBLEM TO BE SOLVED: To provide the video system where a degree of effect to be given to a viewer is estimatedbased on an input video signal and a degree of a cube of a stereoscopic video image is controlled properly.

SOLUTION: This video system consists of a three-dimensional video image reproducing device 1 that outputs a 3-dimension video signala parallax amount detection section 2 that detects a parallax amount of the three-dimensional video signal from the three-dimensional video image reproducing device 1a degree of fatigue evaluation section 3 that evaluates a degree of fatiguebased on the detected parallax amount and provides an output of a video switching signal corresponding to the evaluated amount of fatigue degreea three- dimensional video image/two-dimension video image changeover section 4 that selects a three-dimensional video image or a two-dimensional video image and outputs the selected video image based on the video switching signaland a video display section 5 that displays the three-dimensional video image or the two-dimensional video image.

CLAIMS

[Claim(s)]

[Claim 1]A visual system comprising:

Degree-of-incidence evaluation methods which evaluate a degree of incidence given to an observer from an inputted video signal.

A solid degree control means which carries out inhibitory control of the degree of solid of 3-dimensional scenography shown to an observer based on degree-of-

incidence evaluation quantity obtained by these degree-of-incidence evaluation methods.

[Claim 2]A visual system concerning claim 1wherein said solid degree control means is constituted so that inhibitory control of the degree of solid of 3-dimensional scenography may be carried out to below an accumulation influence allowable limit value given to an observer.
[Claim 3]A visual system concerning claim 1wherein inhibitory control to 3-dimensional scenography of the degree of solid by said solid degree control means which had 3-dimensional scenography controlled is performed so that the degree of solid may be changed smoothly continuouslyor 2.
[Claim 4]A visual system comprising:
Degree-of-incidence evaluation methods which evaluate a degree of incidence given to an observer from an inputted video signal.
A means which carries out switching control of the 3-dimensional scenography to a two-dimensional image based on degree-of-incidence evaluation quantity obtained by these degree-of-incidence evaluation methods.

[Claim 5]A visual system concerning claim 4wherein said image switching control means is constituted so that switching control of the 3-dimensional scenography may be carried out to a two-dimensional imagechanging the degree of solid of 3-dimensional scenography smoothly continuously.
[Claim 6]A visual system concerning any 1 paragraph of claims 1-5wherein said degree-of-incidence evaluation methods are constituted so that time quadrature of the degree of incidence given to an observer may be carried out and it may be evaluated.
[Claim 7]A visual system concerning any 1 paragraph of claims 1-6wherein it has a parallax amount detection means to detect a parallax amount of an image from an inputted video signaland said degree-of-incidence evaluation methods are constituted so that a degree of incidence may be evaluated based on a parallax amount detected by said parallax amount detection means.
[Claim 8]It has a movement magnitude detection means to detect time movement magnitude of an image from an inputted video signalA visual system concerning any 1 paragraph of claims 1-6wherein said degree-of-incidence evaluation methods are constituted so that a degree of incidence may be evaluated based on time movement magnitude of an image detected by said movement magnitude detection means.
[Claim 9]A visual system comprising:
Degree-of-incidence evaluation methods which evaluate a degree of incidence given to an observer from an inputted video signal.
A display control means which controls the method of presentation of an image shown to an observer based on degree-of-incidence evaluation quantity obtained by

these degree-of-incidence evaluation methods.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the visual system which evaluates the degree of incidence given to an observer especially based on a video signal about a visual systemand controlled the degree of solid.

[0002]

[Description of the Prior Art]Although various proposals are conventionally made about the visual systemFor exampleas a technique changed into a 3D scenographya two-dimensional imageThe main video signal which becomes the patent No. 2594235 gazette from a two-dimensional video signal with a standardGenerate the sub video signal delayed to this main video signaland said two-dimensional video signal detects the size and direction of a horizontal motion of an imageA delaying amount for the size of a motion to generate said sub video signal is determinedThe image switching means which inputs main [said] and a sub video signal by the direction of said motion is controlledand the indication is made about the method of changing into a 3D scenography main [said] and the two-dimensional image determine which is made into a left eye video signal and a right eye video signal among sub video signalsand it was made to output.

[0003]To JP9-116928Aa level phase generates the 1st phase shift image that is overdue gradually toward a perpendicular direction based on a two-dimensional input image for every fieldand. Based on an input imagea level phase generates the 2nd phase shift image that progresses gradually toward a perpendicular direction for every fieldOne side is made into the image for left eyes among the 1st phase shift image and the 2nd phase shift imageand the indication is made about the technique of changing a two-dimensional image into a 3D scenography by making another side into a right eye image.

[0004]By the waywhen observing 3-dimensional scenography generallyit is said compared with the case where the usual two-dimensional image is observed that eyes get fatigued easily. As a proposal taken into considerationthis point to JP9-23451A. The sensor which detects the skin temperature of a frame to the glasses for 3-dimensional scenography viewing and listeningand the sensor which detects the skin temperature of a nose are formedThe degree of agitation is made to output from an agitation degree data converter based on those detect outputsForm the sensor which detects a blink in the glasses for 3-dimensional scenography viewing and listeningand fatigue is made to output to them based on the detect outputBased on the degree of

agitationand fatiguea solid emphasis degree is outputted from a solid emphasis degree control circuitThe indication is made about the control device controls the delaying amount of the field memory of the stereoscopic television receiver which carries out two dimensions and three-dimensional conversion with this solid emphasis degreeand it enabled it to control in the desirable solid state according to a user's sensibility.
[0005]
[Problem(s) to be Solved by the Invention]Howeverwhen the degree of solid of 3-dimensional scenography is controlled like the method of the above-mentioned gazette indication based on a user's degree of agitation and fatigueAt a user's living body measurement valueindividual difference is largeit is difficult to define the limit value of suitable fatigue from a living body measurement value for all the observersand obtaining a measurement value from each observer individually further also has the problem of being complicated.
[0006]This invention was made in order to cancel the above-mentioned problem in the solid degree control device of the conventional 3-dimensional scenographyand it guesses the degree of incidence which will be given to the observer based on the inputted video signaland an object of this invention is to provide the visual system which enabled it to control the degree of solid of 3-dimensional scenography appropriately.
[0007]
[Means for Solving the Problem]In order that this invention may solve the above-mentioned probleman invention concerning claim 1 is characterized by that a visual system comprises:
Degree-of-incidence evaluation methods which evaluate a degree of incidence given to an observer from an inputted video signal.
In a visual system an invention which is characterized by having a solid degree control means which carries out inhibitory control of the degree of solid of 3-dimensional scenography shown to an observer based on degree-of-incidence evaluation quantity obtained by these degree-of-incidence evaluation methodsand relates to claim 4Degree-of-incidence evaluation methods which evaluate a degree of incidence given to an observer from an inputted video signal.
A means which carries out switching control of the 3-dimensional scenography to a two-dimensional image based on degree-of-incidence evaluation quantity obtained by these degree-of-incidence evaluation methods.
An invention which relates to claim 9 again as for this invention is characterized by that a visual system comprises:
Degree-of-incidence evaluation methods which evaluate a degree of incidence given to an observer from an inputted video signal.
A display control means which controls the method of presentation of an image shown to an observer based on degree-of-incidence evaluation quantity obtained by these degree-of-incidence evaluation methods.

[0008]As mentioned abovean invention concerning claims 1 and 4Since a degree of incidence given to an observer from an inputted video signal is evaluatedand the degree of solid of 3-dimensional scenography is carried out to inhibitory control and it is made to carry out switching control of the 3-dimensional scenography to a two-dimensional image based on the degree-of-incidence evaluation quantityA visual system which can control 3-dimensional scenography appropriately not to have influence of fatigue etc. on an observer can be realized without performing an observer's living body measurement. Since an invention concerning claim 9 evaluates a degree of incidence given to an observer from an inputted video signal and he is trying to control the method of presentation of an image based on the degree-of-incidence evaluation quantityWithout performing an observer's living body measurement similarlya visual system in which things for which the method of presentation of an image is controlled appropriatelysuch as a change on a two-dimensional image of 3-dimensional scenography and control of a parallax amountare possible can be provided so that it may not have influence of fatigue etc. on an observer.

[0009]

[Embodiment of the Invention]Nextan embodiment is described. Drawing 1 is an outline block lineblock diagram showing a 1st embodiment of the visual system concerning this invention. A parallax amount primary detecting element for the 3D scenography reproduction machine with which 1 sends out a 3D scenography signaland 2 to detect the parallax amount of the 3D scenography signal outputted from the 3D scenography reproduction machine 1 in drawing 1The fatigue evaluating part which evaluates fatigue based on the parallax amount from which 3 was detected in the parallax amount primary detecting element 2and 4 with the image switch signal outputted based on evaluation of fatigue. The 3D scenography / two-dimensional image switching part which changes and outputs a 3D scenography signal and a two-dimensional video signaland 5 are image displays which display the 3D scenography or two-dimensional image outputted from this image switching part 4. Suppose that a 3-D image [a 3D scenography] is written and 2D image [a two-dimensional image] is written in a figure.

[0010]Nextthe parallax amount in a 3D scenography signal is explained based on (A) - (C) of drawing 2. (A) of drawing 2 is a figure showing the observation mode in the case of the three-dimensional (solid) image where a sphere jumps outand which is in sightThey are a lens with which a left eye and a right eyeand 12 have been arranged for 11a and 11b just before a left eye and a right eyerespectivelythe LCD image display for left eyes which 13a and 13b adjoin the lens 12respectivelyand is arrangedand a LCD image display for right eyesThe image shown in (B) of drawing 2 and (C)respectively is displayed. In (B) of drawing 2and (C)** seal shows the image of infinite distance and O seal shows the sphere displayed in three dimensions

(elutriation display). And XL expresses the spherical horizontal position of a left projected imageand the horizontal position of the sphere [XR] of a right projected imageand these values are equally shifted to rightist inclinations or the left from the median.

[0011]In (A) of drawing 215 is the virtual image position where the sphere seen by an eye on either side is displayedand the focus of both eyes suits its position of this. 14 is a fusion position where two images of the virtual image position 15 are in sight as one image with both eyes. And although congestion distance and the distance from the position of the lens 12 to the virtual image position 15 are called distance of sight as for the distance from the position of the lens 12 to the fusion position 14 and a parallax amount is expressed with the difference (XL-XR) of the horizontal position of an image on either sideCongestion distance is supported and that a parallax amount is large means that the degree of elutriation to this side is large.

[0012]Nexta parallax amount and the relation of fatigue are explained. The statement of the following meaning is made with the figure showing the congestion shown in drawing 3the correspondence relation of regulationand tolerance level in "physiology engineering" (incorporated company new technology communications issuethe December1985 item** 103 pages - ** 105 pages). The congestion of the horizontal axis in drawing 3 corresponds to congestion distanceand is expressed with the distance of an angle of convergence (MW) and its reciprocal. On the other handregulation of a vertical axis corresponds to distance of sightand is expressed with the diopter D. In drawing 3although a 45-degree central solid line is the portion which congestion-regulation supports thoroughly and the field of the neighborhood shows the range permissible with the depth of focus etc.ranges differ for a while by adopting eyesight (epsilon:5micro) and Japanese quince ability to detect (delta:15micro) as a permissible level. The range and dashed line whose fusion the outside curve shows the fusion limit of both eyesthe maximum fusion limit is materialized as for a sunspot solid lineand is again materialized from a double image state as for a dotted line are picture presentation time. The fusion limit when 0.5 second is used is shown. And to videoif it is not solid reappearance within the dashed line rangethe statement of the purport that a remarkable fatigue feeling is produced in prolonged observation is made.

[0013]Although this invention is thought out based on these descriptionit explains the algorithm which should be performed by the fatigue evaluating part in the embodiment shown in drawing 1 below based on the flow chart of drawing 4. Firstdetection of the azimuth difference p is performed from a 3D scenography signal on either side (Step S1). Subsequentlyfunctional calculus for evaluating fatigue based on the detected azimuth difference p is performed (Step S2). This functional calculus is performed in consideration of the influence (fatigue) which the azimuth difference of 3-dimensional scenography has on an observer's eyes. For examplethe degree of incidence given to this eye is called for from the figure showing the correspondence relations and

tolerance level of congestion (azimuth difference)-regulation (distance of sight) of drawing 3. The more the difference of congestion (azimuth difference) and regulation (distance of sight) is largethe more it expresses with this drawing 3 that the degree of incidence (fatigue) given to eyes is large. As shown in a following formula (1) as an example of function f (p) showing the degree of incidence in this casethe more (distance-of-sight-azimuth difference) is largeit is nonlinear andthe more the function in which a degree of incidence increases is created.
Degree-of-incidence =alpha(distance-of-sight-azimuth difference) ^{2}+beta(distance-of-sight-azimuth difference) +gamma .... (1)
From this artificer's experimental resultthe degree of incidence to eyes also understands the large thingso that a time change of azimuth difference is large. Thereforeas an example of function f (p) showing a degree of incidencea function as shown with a following formula (2) can also be created.
Degree-of-incidence =alpha(time change of azimuth difference) ^{2}+beta(time change of azimuth difference) +gamma .... (2)
In the above (1) and (2) typesalphabetaand gamma are a coefficient and a constant.
[0014]Nextthe value f (p) of the degree of incidence required in the above-mentioned functional calculus is compared with the congestion (fusion) allowable limit value a (for examplesunspot solid line value in drawing 3) which can be recognized as 3-dimensional scenography (Step S3). It can be considered that this congestion allowable limit value a is a fatigue allowable limit value. The value f (p) of the degree of incidence required in the functional calculus based on azimuth difference changes and displays a two-dimensional imagewhen larger than the congestion allowable limit value a (step S4). The value f (p) of a degree of incidence performs time accumulation calculation of value [of a degree of incidence] f (p)when smaller than the congestion allowable limit value a (Step S5). Subsequentlythe accumulation calculated value of value [of the degree of incidence for which it asked by the functional calculus based on azimuth difference] f (p) is compared with the accumulation congestion allowable limit value b (Step S6). It can consider that this accumulation congestion allowable limit value b is an accumulation fatigue allowable limit valueand the appliance maker sets it up beforehandor a user adjusts individuallyand it is set upor a user can set it up according to fatigue at the time of actual use. When the accumulation congestion allowable limit value b is exceededa two-dimensional image is changed and displayed (Step S7). In being smaller than the accumulation congestion allowable limit value ba three-dimensional (solid) image is displayed as it is (Step S8)and it carries out repeat execution of the above operation.
[0015]If it changes to a two-dimensional image automatically and returns to an image with a low degree of incidence when the 3D scenography beyond a fusion limit in short time is received according to this algorithma display will be returned to 3-dimensional scenography. And when fatigue is accumulated and full limits are exceeded by observing a 3D scenography for a long timeit will change to a two-

dimensional image automaticallyand a two-dimensional image will be observed after it.
[0016]Nextthe composition of the parallax amount primary detecting element which performs the algorithm shown in drawing 4and a fatigue evaluating part is explained based on the block lineblock diagram of drawing 5. The parallax amount primary detecting element 2 comprises the correlation operation part 2-1 which performs correlation calculation of a video signal on either sideand searches for the azimuth difference signal p. The fatigue evaluating part 3 is equipped with the functional calculus part 3-1 which outputs value-of-a-function [of the degree of incidence (fatigue) corresponding to it] f (p) in response to the azimuth difference signal p outputted from the parallax amount primary detecting element 2. In this functional calculus part 3-1if functional calculus was not actually performedbut it has the table in ROM and the value of the azimuth difference signal p is inputtedvalue-of-a-function f (p) equivalent to the degree of incidence (fatigue) corresponding to it will be read.
[0017]The 1st comparing element [the above-mentioned congestion allowable limit value a / input into the fatigue evaluating part 3 value-of-a-function f (p) outputted from the functional calculus part 3-1and] 3-2Value-of-a-function f (p) similarly outputted from the functional calculus part 3-1 was inputtedand it has the accumulation calculation part 3-3 of the value f (p) which does time accumulation calculation. In said 1st comparing element 3-2the value f (p) from the functional calculus part 3-1 in being larger than the congestion allowable limit value aThe signal which switches 3-dimensional scenography to a two-dimensional image temporarily is outputted to a 3D scenography / two-dimensional image switching part 4and it is constituted so that the stop signal for stopping accumulation calculation temporarily to said accumulation calculation part 3-3 may be sent out. It has the 2nd comparing element 3-4 that compares with the fatigue evaluating part 3 the accumulated outputted from said accumulation calculation part 3-3and said accumulation congestion allowable limit value bWhen the accumulated from the accumulation calculation part 3-3 exceeds the accumulation congestion allowable limit value bit is constituted so that the signal which changes 3-dimensional scenography to a two-dimensional image may always be sent out. Since the value of the accumulation congestion allowable limit value b used in the 2nd comparing element 3-4 of the above can be set up by various methods as stated previouslythe setting-out means of b value according to the setting method is formed.
[0018]Nexta 2nd embodiment is described. Drawing 6 is a block lineblock diagram showing a 2nd embodimentand attaches and shows the same numerals to the same component as a 1st embodiment shown in drawing 1. This embodiment forms the parallax amount converter 6 instead of the 3D scenography / two-dimensional image switching part 4 in a 1st embodimentThe output signal from the 1st comparing element that compares value-of-a-function f (p) and the congestion allowable limit value a corresponding to the azimuth difference of the fatigue evaluating part 3 of the

same composition as a 1st embodiment shown in drawing 5 (azimuth difference suppression signal)And based on the output signal (azimuth difference suppression signal) from the 2nd comparing element that compares the accumulation calculated value of value-of-a-function f (p) and the accumulation congestion allowable limit value b corresponding to azimuth differenceThe parallax amount (the degree of solid) of a 3-dimensional scenography signal is changed into a control parallax amount (the degree of control solid)i.e.the target parallax amount which does not get fatigued even if it continuesfor example and observesand it constitutes so that a control 3-dimensional scenography signal may be outputted. This target parallax amount is equivalent to the value with which the accumulated fatigue by continuous observation is permittedi.e.an accumulation fatigue acceptable value.
[0019]Nextthe example changed into the 3-dimensional scenography signal of a control parallax amount is explained based on drawing 7. In order to show the image for left eyes and the image for right eyes based on a 3-dimensional scenography signal from a 3-dimensional scenography reproduction machine and to control the parallax amount (XL-XR) of these images(A) of drawing 7and (B)The whole image for left eyes shown in (A) of drawing 7 is shifted to left-hand sideand the whole image for right eyes shown in (B) of drawing 7 is shifted to left-hand sideand as shown in (C) of drawing 7and (D)it changes. This shift amount turns into an azimuth difference restraint amount. It can be considered as the 3-dimensional scenography of the parallax amount (the degree of solid) which fatigue does not produce even if a parallax amount (XL'-XR') becomes small and it observes continuously by this operation.
[0020]In the above-mentioned embodimentalthough what shifted the image on either side in the direction differentrespectively as the technique of parallax amount control was shownthere is also a technique performed by depth compression as the control technique of the degree of solid. Namelythe technique of changing into a 3D scenography the two-dimensional image of the JP9-116928A indication previously illustrated as conventional technologyAlthough the depth relation of a subject is guessed from the contrast of a pictureetc. and a 3D scenography is generated by making a picture produce distortion according to the depthIt is distortion so that spherical positions may differ with the image for left eyesand the image for right eyes as shown in (B) of drawing 8 when it surmises that a sphere is before a triangular shape object in a two-dimensional image as applied this technique and shown in (A) of drawing 8. It gives [it is equivalent to azimuth difference (XL-XR)]and 3-dimensional scenography is generated. When controlling the degree of solid thenas shown in (C) of drawing 8the image which stopped the spherical distortion amount is generated. The 3-dimensional scenography by which the degree of solid which compressed depth by this was controlled is obtained. The distortion amount at this time [Parallax amount (XL'-XR')] If it carries outas shown also in the correspondence relation figure of drawing 3it is **0.5 of distance of sight (regulation). It is desirable to use the distortion amount in diopter.

[0021]Nexta 3rd embodiment is described. Although the technique of changing into a 3D scenography the two-dimensional image of the patent No. 2594235 gazette indication previously illustrated as a conventional example sets up a parallax amount (delaying amount) with the size of a motion of a two-dimensional image and generates a 3D scenographyBased on the parallax amount set up in this techniquea two-dimensional image / 3D scenography switch signal is formed in a fatigue evaluating part.
[0022]Drawing 9 is a block lineblock diagram showing a 3rd embodimentand 21 A two-dimensional image reproduction machineBased on the size of the motion in the two-dimensional video signal from the two-dimensional image reproduction machine 2122The parallax amount deciding part which determines a parallax amountand 23 are the fatigue evaluating parts and the fatigue evaluating parts of an identical configuration in 1st and 2nd embodiments shown in drawing 1 and drawing 6and send out a two-dimensional image / 3D scenography switch signal in response to the parallax amount from the parallax amount deciding part 22. The 3D scenography generation part which changes a two-dimensional image into a 3D scenography in response to the parallax amount to which 24 was set by the parallax amount deciding part 22and 25 are image displays which display the 3D scenography or two-dimensional image from the 3D scenography generation part 24.
[0023]He is trying to change from a 3D scenography to a two-dimensional image momentarily discontinuously with the switch signal from a fatigue evaluating part in 1st and 3rd embodiments shown in above-mentioned drawing 1 and drawing 9. Since the amount of time change of azimuth difference is largeit stops howeverbeing able to carry out the fusionif a 3D scenography is momentarily changed to a two-dimensional image in this way. Thenthe modification of the embodiment shown in drawing 1 and drawing 9 to which change to a two-dimensional imagechanging the degree of solid smoothlythat isit was made to change a parallax amount continuously is explained based on drawing 10. this modification makes small gradually azimuth difference (XL-XR) of the image of the right and left of the 3D scenography shown in (A) of drawing 10as shown in (B) of drawing 10and (C)and as eventually shown in (D) of drawing 10it boils and makes it a two-dimensional image as XL=XR. Therebya three dimension / two-dimensional image without displeasure can be changed.
[0024]Nexta 4th embodiment is described. This embodiment is not a parallax amount of a 3D scenographydetects the motion vector of a picture and changes a 3D scenography to a two-dimensional image based on that motion vector. It is said that the influence which gives an observer the intense image of a motion is generally great. This embodiment removes this phenomenon. Drawing 11 is a block lineblock diagram showing a 4th embodimentand 31 A 3D scenography reproduction machineThe motion detection part of a picture for 32 to detect the motion vector of the 3D scenography signal outputted from the 3D scenography reproduction machine 31The fatigue evaluating part which evaluates fatigue based on the motion vector from which 33

was detected in the motion detection part 32 of the pictureand 34 with the switch signal outputted based on evaluation of fatigue. The 3D scenography / two-dimensional image switching part which changes and outputs a 3D scenography signal and a two-dimensional video signaland 35 are image displays which display the 3D scenography signal or two-dimensional video signal outputted from this image switching part 34.

[0025]Nextthe example of detection of the motion vector in the motion detection part 31 of a picture is explained based on (A) - (C) of drawing 12. In this example of detectiona motion vector as the background moved to left-hand side as shown in (A) of drawing 12 and (B)therefore shown in (C) of drawing 12 is detectedfor examplethe average value of that value is inputted into the fatigue evaluating part 33.

[0026]Nextthe algorithm performed by the fatigue evaluating part 33 in this embodiment is explained based on the flow chart of drawing 13. Detection of the 3-dimensional scenography signal lost-motion vector m is performed first (Step S11). Subsequentlyfunctional calculus for evaluating fatigue based on detected motion vector m is performed (Step S12). This functional calculus is performed in consideration of the influence (fatigue) which a motion of the picture in 3-dimensional scenography has on an observer's eyes. For examplebased on the size of a motion vectoror a motionvalue-of-a-function f (m) is called forfor examplethe function which is nonlinear and increases to motion vector m like f(m) = alpha-m ^{2}+ beta-m+gamma is defined. Nextthe value f (m) required in the above-mentioned functional calculus is compared with the allowable limit value a (Step S13). The value f (m) required in the functional calculus based on a motion vector changes and displays a two-dimensional imagewhen larger than the allowable limit value a (Step S14). Value-of-a-function f (m) performs time accumulation calculation of value-of-a-function f (m)when smaller than the allowable limit value a (Step S15). Subsequentlythe accumulation calculated value of value f (m) required in the functional calculus based on a motion vector is compared with the accumulation allowable limit value b (Step S16). When the accumulation calculated value of functional calculus value f (m) exceeds the accumulation allowable limit value ba two-dimensional image changes and is displayed (Step S17). In being smaller than the accumulation allowable limit value ba three-dimensional (solid) image is displayed as it is (Step S18)and it carries out repeat execution of the above operation.

[0027]Nextthe composition of the motion detection part of a picture which performs the algorithm shown in drawing 13and a fatigue evaluating part is explained based on the block lineblock diagram of drawing 14. The motion detection part 32 of the picture comprises the movement quantity calculation part 32-1 which computes the 3-dimensional scenography signal lost-motion vector m. The fatigue evaluating part 33 is equipped with the functional calculus part 33-1 which outputs value-of-a-function f (m) corresponding to it in response to motion vector m outputted from the motion detection part 32 of a picture. In this functional calculus part 33-1if functional

calculus was not actually performed like a 1st embodimentbut it has the table in ROM and the value of motion vector m is inputtedvalue-of-a-function f (m) equivalent to the degree of incidence (fatigue) corresponding to it will be read.
[0028]The 1st comparing element [the above-mentioned allowable limit value a / input into the fatigue evaluating part 33 value-of-a-function f (m) outputted from the functional calculus part 33-1and] 33-2Value-of-a-function f (m) similarly outputted from the functional calculus part 33-1 was inputtedand it has the accumulation calculation part 33-3 of the value f (m) which does time accumulation calculation. In said 1st comparing element 33-2the value f (m) from the functional calculus part 33-1 in being larger than the allowable limit value aThe signal which changes 3-dimensional scenography to a two-dimensional image temporarily is outputted to 3-dimensional scenography / two-dimensional image switch part 34and it is constituted so that the stop signal for stopping accumulation calculation temporarily to said accumulation calculation part 33-3 may be sent out. It has the 2nd comparing element 33-4 that compares with the fatigue evaluating part 33 the accumulated outputted from said accumulation calculation part 33-3and said accumulation congestion allowable limit value bWhen the accumulated from the accumulation calculation part 33-3 exceeds the accumulation congestion allowable limit value bit is constituted so that the signal which always changes 3-dimensional scenography to a two-dimensional image may be sent out.
[0029]Nexta 5th embodiment is described. In a fatigue evaluating part using the size of a motion of the two-dimensional image detected when this embodiment sets up a parallax amount (delaying amount) with the size of a motion of a two-dimensional image like a 3rd embodiment and a 3D scenography is generatedIt constitutes so that a three dimension / two-dimensional image switch signal may be formed.
[0030]Drawing 15 is a block lineblock diagram showing a 5th embodimentand 41 A two-dimensional image reproduction machineThe movement quantity primary detecting element where 42 detects a motion vector based on the two-dimensional video signal from the two-dimensional image reproduction machine 4143 is the fatigue evaluating part 33 in a 4th embodiment shown in drawing 11and a fatigue evaluating part which sends out a three dimension / two-dimensional image switch signal in response to the motion vector from the movement quantity primary detecting element 42 of an identical configuration. The 3D scenography generation part which changes a two-dimensional image into a 3D scenography in response to the motion vector from which 44 was detected in the movement quantity primary detecting element 42and 45 are image displays which display the 3D scenography or two-dimensional image from the 3D scenography generation part 44.
[0031]Also in 4th and 5th embodiments of the aboveinstead of changing a 3D scenography to a two-dimensional imageit can also constitute with the output signal from a fatigue evaluating part so that the degree of solid of a 3D scenography may be controlled. As shown in drawing 7drawing 8and drawing 10it can also constitute so

that a parallax amount may be changed smoothly.
[0032]
[Effect of the Invention]As it explained based on the embodiment aboveaccording to the invention concerning claims 1 and 4. Since it constitutes so that the degree of incidence given to an observer from the inputted video signal is evaluatedthe degree of solid of 3-dimensional scenography may be carried out to inhibitory control and switching control of the 3-dimensional scenography may be carried out to a two-dimensional image based on the degree-of-incidence evaluation quantityThe visual system which can control 3-dimensional scenography appropriately not to have influence of fatigue etc. on an observer can be realized without performing an observer's living body measurement. Since the degree of incidence given to an observer from the inputted video signal is evaluated and he is trying to control the method of presentation of an image based on the degree-of-incidence evaluation quantity according to the invention concerning claim 9Without performing an observer's living body measurement similarlythe visual system in which things for which the method of presentation of an image is controlled appropriatelysuch as a change on the two-dimensional image of 3-dimensional scenography and control of a parallax amountare possible can be provided so that it may not have influence of fatigue etc. on an observer.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is an outline block lineblock diagram showing a 1st embodiment of the visual system concerning this invention.
[Drawing 2]It is an explanatory view for explaining the parallax amount in a 3D scenography.
[Drawing 3]It is a figure showing the congestion for explaining a parallax amount and the relation of fatiguethe correspondence relation of regulationand tolerance level.
[Drawing 4]It is a flow chart for explaining the algorithm performed by the fatigue evaluating part in a 1st embodiment shown in drawing 1.
[Drawing 5]It is a block diagram showing the composition of the fatigue evaluating part in a 1st embodiment shown in drawing 1.
[Drawing 6]It is a block lineblock diagram showing a 2nd embodiment of this invention.
[Drawing 7]It is an explanatory view showing the example of solid degree control of 3-dimensional scenography.
[Drawing 8]It is an explanatory view showing other examples of solid degree control of 3-dimensional scenography.
[Drawing 9]It is a block lineblock diagram showing a 3rd embodiment of this invention.
[Drawing 10]It is a figure showing the mode to which a parallax amount is continuously

changed in 3-dimensional scenography.
[Drawing 11]It is a block lineblock diagram showing a 4th embodiment of this invention.
[Drawing 12]It is an explanatory view showing the example of detection of the motion vector in an image.
[Drawing 13]It is a flow chart for explaining the algorithm performed by the fatigue evaluating part in a 4th embodiment shown in drawing 11.
[Drawing 14]It is a block diagram showing the composition of the fatigue evaluating part in a 4th embodiment shown in drawing 11.
[Drawing 15]It is a block lineblock diagram showing a 5th embodiment of this invention.
[Description of Notations]
1 3D scenography reproduction machine
2 Parallax amount primary detecting element
2-1 Correlation calculation part
3 Fatigue evaluating part
3-1 Functional calculus part
3-2 The 1st comparing element
3-3 Accumulation calculation part
3-4 The 2nd comparing element
4 A 3D scenography / two-dimensional image switch part
5 Image display
6 Parallax amount converter
11a Left eye
11b Right eye
12 Lens
13a The LCD image display for left eyes
13b The LCD image display for right eyes
14 Fusion position
15 Virtual image position
21 Two-dimensional image reproduction machine
22 Parallax amount deciding part
23 Fatigue evaluating part
24 3D scenography generation part
25 Image display
31 3D scenography reproduction machine
32 The motion detection part of a picture
32-1 Movement quantity calculation part
33 Fatigue evaluating part
33-1 Functional calculus part
33-2 The 1st comparing element
33-3 Accumulation calculation part
33-4 The 2nd comparing element

34 A 3D scenography / two-dimensional image switch part
35 Image display
41 Two-dimensional image reproduction machine
42 Movement quantity primary detecting element
43 Fatigue evaluating part
44 3D scenography generation part
45 Image display